

### **A LISTING OF THE CLAIMS:**

The following listing of claims will replace all prior versions and listings of claims in the application.

#### **Listing Of Claims:**

Claim 1 (Previously Presented) A stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from 15 to 30% by weight and comprising the reaction product of:

a)(1) a diphenylmethane diisocyanate comprising:

- (i) from 10 to 40% by weight of 2,4'-diphenylmethane diisocyanate,
  - (ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
  - and
  - (iii) from 54 to 90% by weight of 4,4'-diphenylmethane diisocyanate,
- wherein the %'s by weight of a)(1)(i), a)(1)(ii) and a)(1)(iii) total 100% by weight of a)(1);

and

b) an organic compound containing at least one hydroxyl group,  
in the presence of a catalytic amount of

c) at least one catalyst selected from the group consisting of (1) one or more trimer catalysts, (2) one or more allophanate catalysts, (3) an allophanate-trimer catalyst system and (4) mixtures thereof, with the proviso that when said catalyst c)(2) is present, then catalyst c)(1) and/or catalyst system c)(3) is also present;

wherein component b) is present in a quantity such that there are from about 0.01 to about 0.25 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, at least about 50% of the urethane groups are converted to allophanate groups by c) said catalyst or catalyst system, and a catalyst stopper is added once the desired NCO group content is attained.

Claim 2 (Previously Presented) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein the NCO group content is from 20 to 28% by weight.

Claim 3 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein a)(1) said diphenyl-methane diisocyanate comprises (i) from 20 to 35% by weight of the 2,4'-isomer, (ii) from 0 to 2% by weight of the 2,2'-isomer, and (iii) from 63 to 80% by weight of the 4,4'-isomer, with the %'s by weight of a)(1)(i), a)(1)(ii) and a)(1)(iii) totaling 100% by weight of a)(1).

Claim 4 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein component b) is present in an amount such that there are from about 0.01 to 0.20 equivalent hydroxyl groups per equivalent of isocyanate of the diphenylmethane diisocyanate present.

Claim 5 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein at least about 70% of the urethane groups are converted to allophanate groups by c) said catalyst.

Claim 6 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein the allophanate groups and the trimer groups were formed simultaneously.

Claim 7 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein the allophanate groups were formed first, and then the trimer groups were formed.

Claim 8 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein b) said organic compound has a molecular weight of from about 32 to about 6,000 and contains from about 1 to about 4 hydroxyl groups.

Claim 9 (Original) The stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1, wherein b) comprises 2-propanol or isobutyl alcohol.

Claim 10 (Previously Presented) A process for the preparation of a stable liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from 15 to 30% by weight, comprising:

(1) heating

a)(1) diphenylmethane diisocyanate comprising:

(i) from 10 to 40% by weight of 2,4'-diphenylmethane diisocyanate,

(ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,

and

(iii) from 54 to 90% by weight of 4,4'-diphenylmethane diisocyanate,

wherein the %'s by weight of a)(1)(i), a)(1)(ii) and a)(1)(iii) total 100% by weight of a)(1);

and

b) an organic compound containing at least one hydroxyl group, to a temperature of about 70 to 120°C for a time period of about 1 to about 6 hrs., in the presence of a catalytic amount of:

c) at least one catalyst selected from the group consisting of (1) one or more trimer catalysts, (2) one or more allophanate catalysts, (3) an allophanate-trimer catalysts system and (4) mixtures thereof, with the proviso that when catalyst c)(2) is present, then catalyst c)(1) and/or catalyst system c)(3) is also present;

wherein the quantity of b) is such that there are from about 0.01 to about 0.25 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, and at least about 50% of the urethane groups are converted to allophanate groups by c) said catalyst(s),

and

- (2) adding a catalyst stopper once the desired NCO group content of the reaction mixture in (1) is attained to neutralize the catalyst in the reaction mixture.

Claim 11 (Previously Presented) The process of Claim 10, wherein the NCO group content is from 20 to 28% by weight.

Claim 12 (Original) The process of Claim 10, wherein a)(1) said diphenylmethane diisocyanate comprises (i) from 20 to 35% by weight of the 2,4'-isomer, (ii) from 0 to 2% by weight of the 2,2'-isomer, and (iii) from 63 to 80% by weight of the 4,4'-isomer, with the %'s by weight of a)(1)(i), a)(1)(ii) and a)(1)(iii) totaling 100% by weight of a)(1).

Claim 13 (Original) The process of Claim 10, wherein component b) is present in an amount such that there are from about 0.01 to 0.20 equivalent hydroxyl groups per equivalent of isocyanate of the diphenylmethane diisocyanate present.

Claim 14 (Original) The process of Claim 10, wherein at least about 70% of the urethane groups are converted to allophanate groups by c) said catalyst.

Claim 15 (Original) The process of Claim 10, wherein c) the catalyst is selected such that the allophanate groups and the trimer groups form simultaneously.

Claim 16 (Original) The process of Claim 10, wherein c) the catalyst is selected such that the allophanate groups are formed first, and then another suitable catalyst c) is added such that the trimer groups are formed.

Claim 17 (Original) The process of Claim 10, wherein b) said organic compound has a molecular weight of from about 32 to about 6,000 and contains from about 1 to about 4 hydroxyl groups.

Claim 18 (Original) The process of Claim 10, wherein b) comprises 2-propanol or isobutyl alcohol.

Claim 19 (Withdrawn) A stable liquid allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from 15 to 30% and comprising:

(A) from 20 to 65% by weight, based on 100% by weight of (A) and (B), of an allophanate-modified diphenylmethane diisocyanate having an NCO group content of from about 16 to about 29%, and comprising the reaction product of:

a)(2) a diphenylmethane diisocyanate comprising

- (i) from 0 to 60 % by weight of 2,4'-diphenylmethane diisocyanate,
- (ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
- and
- (iii) from 34 to 100% by weight of 4,4'-diphenylmethane diisocyanate,

wherein the %'s by weight of a)(2)(i), a)(2)(ii) and a)(2)(iii) total 100 % by weight of a)(2),

and

b) an organic compound containing at least one hydroxyl group, in the presence of

c)(2) one or more allophanate catalyst,

wherein component b) is present in a quantity such that there are from about 0.05 to about 0.25 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, at least about 50% of the urethane groups are converted to allophanate groups by c)(2), and a catalyst stopper is added once the desired NCO group content of the allophanate-modified MDI is attained;

and

(B) from 35 to 80% by weight, based on 100% by weight of (A) and (B), of a partially trimerized diphenylmethane diisocyanate having an NCO group content of from about 20 to about 31%, and comprising the trimerization product of:

- a)(3) a diphenylmethane diisocyanate comprising
- (i) from 10 to 60 % by weight of 2,4'-diphenylmethane diisocyanate,
  - (ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,
  - and
  - (iii) from 34 to 90% by weight of 4,4'-diphenylmethane diisocyanate,
- wherein the %'s by weight of a)(3)(i), a)(3)(ii) and a)(3)(iii) total 100 % by weight of a)(3),

in the presence of

- c) at least one catalyst selected from the group consisting of (1) one or more trimer catalysts, (3) a trimer-allophanate catalyst system and (4) mixtures thereof;

wherein the trimer content is at least about 10 to about 80%, based on 100% by weight of component (B), and a catalyst stopper is added once the desired NCO group content of the trimer modified MDI is attained.

Claim 20 (Withdrawn) The blend of Claim 19 having an NCO group content of 20 to 28%, and comprising:

- (A) from 30 to 60% by weight, based on 100% by weight of (A) and (B), of an allophanate-modified diphenylmethane diisocyanate having an NCO group content of about 20 to about 28%,

and

- (B) from 40 to 70% by weight, based on 100% by weight of (A) and (B), of partially trimerized diphenylmethane diisocyanate having an NCO group content of about 22 to about 29%

Claim 21 (Withdrawn) The blend of Claim 19, wherein:

- (A) said allophanate-modified diphenylmethane diisocyanate comprises the reaction product of:

- a)(2) a diphenylmethane diisocyanate comprising:
- (i) from 10 to 50% by weight of 2,4'-diphenylmethane diisocyanate,
  - (ii) from 0 to 4% by weight of 2,2'-diphenylmethane diisocyanate,

and

(iii) from 50 to 90% by weight of 4,4'-diphenylmethane diisocyanate, with the %'s by weight of a)(2)(i), a)(2)(ii) and a)(2)(iii) totalling 100% by weight of a)(2);

b) an organic compound having a molecular weight of from about 32 to about 6,000 and containing from about 1 to about 4 hydroxyl groups;

in the presence of

c) one or more allophanate catalyst.

Claim 22 (Withdrawn) The blend of Claim 19, wherein in (A) the allophanate-modified diphenylmethane diisocyanate, the quantity of b) is such that there are from about 0.10 to 0.20 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, and at least about 70% of the urethane groups are converted to allophanate groups.

Claim 23 (Withdrawn) The blend of Claim 19, wherein (B) said trimerized diphenylmethane diisocyanate comprises the trimerization product of

a)(3) a diphenylmethane diisocyanate comprising the reaction product of:

(i) from 20 to 40% by weight of 2,4'-diphenylmethane diisocyanate,

(ii) from 0 to 2% by weight of 2,2'-diphenylmethane diisocyanate,  
and

(iii) from 60 to 80% by weight of 4,4'-diphenylmethane diisocyanate, wherein the %'s by weight of a)(3)(i), a)(3)(ii) and a)(3)(iii) total 100% by weight of a)(3);

in the presence of:

c) at least one catalyst selected from the group consisting of (1) one or more trimer catalysts, (3) a trimer-allophanate catalyst system and (4) mixtures thereof;

wherein the trimer content is at least about 25 to about 60%, based on 100% by weight of component (B).

Claim 24 (Withdrawn) The blend of Claim 19, wherein b) said organic compound has a molecular weight of from about 32 to about 6,000 and contains from about 1 to about 4 hydroxyl groups.

Claim 25 (Withdrawn) The blend of Claim 19, wherein b) comprises 2-propanol or isobutyl alcohol.

Claim 26 (Withdrawn) A process for the preparation of a stable liquid allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from 15 to 30% and comprising

(1) blending

(A) from 20 to 65% by weight, based on 100% by weight of (A) and (B), of an allophanate-modified diphenylmethane diisocyanate having an NCO group content of from about 16 to about 29, and comprising the reaction product of

a)(2) a diphenylmethane diisocyanate comprising

(i) from 0 to 60 % by weight of 2,4'-diphenylmethane diisocyanate,

(ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,

and

(iii) from 34 to 100% by weight of 4,4'-diphenylmethane diisocyanate,

wherein the %'s by weight of a)(2)(i), a)(2)(ii) and a)(2)(iii) total 100 % by weight of a)(2),

with

b) an organic compound containing at least one hydroxyl group, in the presence of:

c) (2) one or more allophanate catalyst,

wherein component b) is present in a quantity such that there are from about 0.05 to about 0.25 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, at least about, at least about 50% of the



urethane groups are converted to allophanate groups by c)(2) and a catalyst stopper is added once the desired NCO group content of the allophanate-modified MDI is attained;

with

(B) from 35 to 80% by weight, based on 100% by weight of (A) and (B), of an at least partially trimerized diphenylmethane diisocyanate having an NCO group content of from about 20 to about 31%, and comprising the trimerization product of

a)(3) a diphenylmethane diisocyanate comprising

(i) from 10 to 60 % by weight of 2,4'-diphenylmethane diisocyanate,

(ii) from 0 to 6% by weight of 2,2'-diphenylmethane diisocyanate,

and

(iii) from 34 to 90% by weight of 4,4'-diphenylmethane diisocyanate,

wherein the %'s by weight of a)(3)(i), a)(3)(ii) and a)(3)(iii) total 100% by weight of a)(3),

formed in the presence of:

c) at least one catalyst selected from the group consisting of (1) one or more trimer catalyst, (3) a trimer-allophanate catalyst system and (4) mixtures thereof;

wherein the trimer content is at least about 10 to about 80%, based on 100% by weight of component (B), and a catalyst stopper is added once the desired NCO group content is achieved,

and

(2) cooling the blend to ambient temperature.

Claim 27 (Withdrawn) The process of Claim 26, having an NCO group content of 20 to 28%, and comprising:

(A) from 30 to 60% by weight, based on 100% by weight of (A) and (B), of an allophanate-modified diphenylmethane diisocyanate having an NCO group content of about 20 to about 28%,

and

(B) from 40 to 70% by weight, based on 100% by weight of (A) and (B), of partially trimerized diphenylmethane diisocyanate having an NCO group content of about 22 to about 29%

Claim 28 (Withdrawn) The process of Claim 26, wherein:

(A) said allophanate-modified diphenylmethane diisocyanate comprises the reaction product of:

a)(2) a diphenylmethane diisocyanate comprising:

(i) from 10 to 50% by weight of 2,4'-diphenylmethane diisocyanate,

(ii) from 0 to 4% by weight of 2,2'-diphenylmethane diisocyanate,

and

(iii) from 50 to 90% by weight of 4,4'-diphenylmethane diisocyanate,

with the %'s by weight of a)(2)(i), a)(2)(ii) and a)(2)(iii) totalling 100% by weight of a)(2);

b) an organic compound having a molecular weight of from about 32 to about 6,000 and containing from about 1 to about 4 hydroxyl groups;

in the presence of

c) one or more allophanate catalyst.

Claim 29 (Withdrawn) The process of Claim 26, wherein in (A) the allophanate-modified diphenylmethane diisocyanate, the quantity of b) is such that there are from about 0.10 to 0.20 equivalent hydroxyl groups per equivalent of isocyanate of the MDI present, and at least about 70% of the urethane groups are converted to allophanate groups.

Claim 30 (Withdrawn) The process of Claim 26, wherein (B) said trimerized diphenylmethane diisocyanate comprises the trimerization product of

a)(3) a diphenylmethane diisocyanate comprising the reaction product of:

- (i) from 20 to 40% by weight of 2,4'-diphenylmethane diisocyanate,
  - (ii) from 0 to 2% by weight of 2,2'-diphenylmethane diisocyanate,
  - and
  - (iii) from 60 to 80% by weight of 4,4'-diphenylmethane diisocyanate,
- wherein the %'s by weight of a)(3)(i), a)(3)(ii) and a)(3)(iii) total 100% by weight of a)(3);

in the presence of:

- c) at least one catalyst selected from the group consisting of (1) one or more trimer catalysts, (3) a trimer-allophanate catalyst system and (4) mixtures thereof;

wherein the trimer content is at least about 25 to about 60%, based on 100% by weight of component (B).

**Claim 31 (Withdrawn)** The process of Claim 26, wherein b) said organic compound has a molecular weight of from about 32 to about 6,000 and contains from about 1 to about 4 hydroxyl groups.

**Claim 32 (Withdrawn)** The process of Claim 26, wherein b) comprises 2-propanol or isobutyl alcohol.

**Claim 33 (Withdrawn)** A storage stable, liquid, urethane prepolymer of an allophanate modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of 8 to 28%, and comprising the reaction product of:

- (I) the storage stable, liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1,
- and
- (II) an isocyanate-reactive component containing from about 1.5 to about 6 hydroxyl groups and having a molecular weight of from about 76 to about 10,000.

**Claim 34 (Withdrawn)** The storage stable, liquid, urethane prepolymer of Claim 33, wherein the NCO group content is from about 12 to about 26%.

Claim 35 (Withdrawn) The storage stable, liquid urethane prepolymer of Claim 33, wherein (II) said isocyanate-reactive component contains from 2 to 6 hydroxyl groups and has a molecular weight of about 90 to about 6,000.

Claim 36 (Withdrawn) A process for the preparation of a storage-stable, liquid, urethane prepolymer of an allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from about 8 to about 28, comprising:

(1) reacting:

(I) the storage stable, liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 1,

with

(II) an isocyanate-reactive component containing from about 1.5 to about 6 hydroxyl groups and having a molecular weight of from about 76 to about 10,000,

at a temperature of from 40 to 80°C for 1 to 6 hours.

Claim 37 (Withdrawn) The process of Claim 36, wherein the NCO group content is from about 12 to about 26%.

Claim 38 (Withdrawn) The process of Claim 36, wherein (II) said isocyanate-reactive component contains from 2 to 6 hydroxyl groups and has a molecular weight of about 90 to about 6,000.

Claim 39 (Withdrawn) A storage stable, liquid, urethane prepolymer of an allophanate modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of 8 to 28%, and comprising the reaction product of:

(III) the storage-stable, liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 19,

and

- (II) an isocyanate-reactive component containing from about 1.5 to about 6 hydroxyl groups and having a molecular weight of from about 76 to about 10,000.

Claim 40 (Withdrawn) The prepolymer of Claim 39, wherein the NCO group content is from about 12 to about 26%.

Claim 41 (Withdrawn) The prepolymer of Claim 39, wherein (II) said isocyanate-reactive component contains from 2 to 6 hydroxyl groups and has a molecular weight of about 90 to about 6,000.

Claim 42 (Withdrawn) A process for the preparation of a storage-stable, liquid, urethane prepolymer of an allophanate-modified, partially trimerized diphenylmethane diisocyanate having an NCO group content of from about 8 to about 28%, comprising:

(1) reacting:

(III) the storage-stable, liquid, allophanate-modified, partially trimerized diphenylmethane diisocyanate of Claim 19,

and

(II) an isocyanate-reactive component containing from about 1.5 to about 6 hydroxyl groups and having a molecular weight of from about 76 to about 10,000,

at a temperature of from 40 to 80°C for 1 to 6 hours.

Claim 43 (Withdrawn) The process of Claim 42, wherein the NCO group content is from about 12 to about 26%.

Claim 44 (Withdrawn) The process of Claim 42, wherein (II) said isocyanate-reactive component contains from 2 to 6 hydroxyl groups and has a molecular weight of about 90 to about 6,000.